

MEMORANDUM OF UNDERSTANDING BETWEEN
THE DEPARTMENT OF EDUCATION
OF THE FLEMISH COMMUNITY (BELGIUM) AND
THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
OF THE UNITED STATES OF AMERICA
FOR COOPERATION IN THE GLOBE PROGRAM

PREAMBLE

The Department of Education of the Flemish Community (Belgium) (hereinafter, the Flemish side), and the National Oceanic and Atmospheric Administration of the United States of America, acting on behalf of itself and other U.S. Government agencies participating in the GLOBE Program (hereinafter, the U.S. side),

Intending to increase the awareness of students throughout the world about the global environment,

Seeking to contribute to increased scientific understanding of the Earth, and

Desiring to support improved student achievement in science and mathematics,

Wishing to conduct activities in furtherance of the Global Learning and Observations to Benefit the Environment (GLOBE) Program,

Have agreed to the following terms and conditions:

ARTICLE 1 - THE GLOBE PROGRAM

The GLOBE Program is an international environmental science and education program that will bring students, teachers, and scientists together to study the global environment. GLOBE will create an international network of students in grades K-12 (or equivalent) studying environmental issues, making environmental measurements, and sharing useful environmental data with the international environmental science community.

ARTICLE 2 - RESPECTIVE RESPONSIBILITIES

A. The U.S. side will:

1. Identify U.S. schools that will participate in the GLOBE Program (details regarding GLOBE schools in Appendix A);
2. Select, in consultation with international scientists and educators, the GLOBE environmental measurements and types of measurement equipment (described in Appendix B);
3. Select Principal Investigator Teams for the GLOBE environmental measurements, and support the U.S. members of the Teams;
4. Calibrate, if necessary, measurement equipment that cannot be calibrated by GLOBE teachers and students;
5. Develop, in consultation with international scientists and educators, GLOBE educational materials;
6. Translate GLOBE instructional materials related to measurement procedures and data reporting protocols into the six United Nations languages, and provide these plus all broader GLOBE educational materials to the Flemish side for further reproduction as necessary;
7. Conduct annual regional training sessions for GLOBE Country Coordinators and GLOBE teachers who will serve as trainers for additional GLOBE teachers in the Flemish Community, and provide a copy of GLOBE training materials to the Flemish side;
8. Design, develop, operate, and maintain GLOBE data processing capabilities and other necessary technology and equipment;
9. Provide GLOBE software, as necessary, for use on Flemish GLOBE school computers. (To the maximum extent possible, textual material appearing on computer screens will be accessible in the student's choice among the six United Nations languages.);
10. Accept environmental data reported from GLOBE schools around the world, and develop and provide resultant global environmental images (visualization products) to the Flemish side; and
11. Evaluate the overall GLOBE Program periodically, in consultation with international GLOBE Country Coordinators, and modify the overall program as appropriate.

B. The Flemish side will:

1. Select Flemish schools to participate in the GLOBE Program (details regarding GLOBE schools in Appendix A) and provide an updated list of Flemish GLOBE schools to the U.S. side at the beginning of each school year;
2. Ensure that Flemish GLOBE schools conduct the fundamental activities of GLOBE schools detailed in Appendix A (take GLOBE environmental measurements, report data, and receive and use resultant global environmental images, using GLOBE educational materials under the guidance of teachers trained to conduct the GLOBE Program);
3. Name a Flemish Government Point of Contact responsible for policy-level communications with the Director of the GLOBE Program;
4. Name a Community Coordinator responsible for day-to-day management, oversight, and facilitation of the GLOBE Program in the Flemish Community;
5. Ensure that the Community Coordinator and some GLOBE teachers attend GLOBE regional training and in turn provide GLOBE training to at least one teacher in each Flemish GLOBE school;
6. Ensure that GLOBE instructional materials related to measurement procedures and data reporting protocols are utilized in Flemish GLOBE schools, and that broader GLOBE educational materials are appropriately translated, adapted, reproduced, and distributed to all Flemish GLOBE schools;
7. Ensure that Flemish GLOBE schools have the necessary measurement equipment to take GLOBE environmental measurements (described in Appendix B);
8. Ensure that teachers and students at Flemish GLOBE schools calibrate GLOBE measurement equipment according to procedures provided in GLOBE instructional materials;
9. Ensure that Flemish GLOBE schools have the necessary computer and communications systems (described in Appendix C) to report GLOBE environmental measurements and to receive and use GLOBE visualization products, or make agreed alternative arrangements for such reporting and receipt. (At a minimum, the Flemish Community Coordinator will need access to Internet so that all measurement data from Flemish GLOBE schools will be reported via Internet.); and

10. Evaluate GLOBE operations in the Flemish Community periodically and assist the U.S. side in conducting periodic evaluation of the overall GLOBE Program.

ARTICLE 3 - FINANCIAL AND LEGAL ARRANGEMENTS

Each side will bear the costs of fulfilling its respective responsibilities under this agreement. Obligations of each side pursuant to this agreement are subject to its respective funding procedures and the availability of appropriated funds, personnel, and other resources.

The conduct of activities under this agreement will be consistent with the relevant laws and regulations of the two sides. Nothing in this Memorandum of Understanding is intended to create binding obligations under international law.

ARTICLE 4 - EXCHANGE OF DATA AND GOODS

GLOBE environmental measurement data, visualization products, software, and educational materials will be available worldwide without restriction as to their use or redistribution.

ARTICLE 5 - RELEASE OF INFORMATION ABOUT THE GLOBE PROGRAM

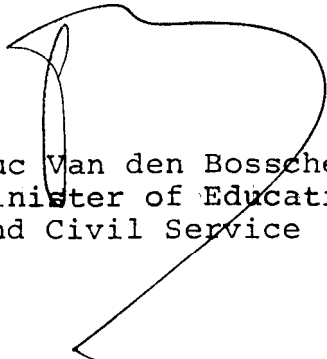
Each side may release information on the GLOBE Program as it may deem appropriate without prior consultation with the other.

ARTICLE 6 - ENTRY INTO FORCE, AMENDMENTS, WITHDRAWAL

Activities under this Memorandum of Understanding will begin upon signature by the two sides and will continue for five years. They may be automatically extended for further five-year periods, unless either side decides to discontinue them and so notifies the other side with three months written notice. Activities hereunder may be terminated at any time by either side upon three months prior written notice to the other side. This Memorandum of Understanding may be amended by written agreement of the two sides.

Done at Brussels on the twenty-fourth day of March, 1995.

For the Department of Education of
the Flemish Community (Belgium):



Luc Van den Bossche
Minister of Education
and Civil Service

For the National Oceanic and
Atmospheric Administration of
the United States of America:



Alan J. Blinken
Ambassador

APPENDIX A GLOBE Schools

Each partner will be responsible for identifying its participating schools. Schools should be selected so as to satisfy the objectives of the GLOBE Program. In particular, partners should emphasize the selection of schools that will maximize the number of students worldwide participating in the program. Also, partners should consider involving schools in locations that will yield measurement data that is important to the international environmental science community .

Students at all GLOBE schools throughout the world will conduct the following fundamental activities: they will make environmental measurements at or near their schools; report their data to a GLOBE data processing site; receive vivid graphical global environmental images (visualization products) created from their data and the data from other GLOBE schools around the world; and study the environment by relating their observations and the resulting visualization products to broader environmental topics. All of these activities will be conducted under the guidance of specially trained teachers (GLOBE-trained teachers).

GLOBE educational materials will be used in GLOBE schools under the guidance of GLOBE-trained teachers. These materials will detail procedures for taking environmental measurements and protocols for reporting data; explain the significance of the measurements; guide the use of the visualization products; and integrate the measurement aspects of the program into a broader study of the environment.

Schools throughout the United States and the rest of the world that are not GLOBE schools may become GLOBE Affiliate schools by observing the GLOBE Program in operation through the Internet. Students at these schools will benefit from the use of GLOBE visualization products and educational materials accessible on-line. All GLOBE Affiliate schools will be encouraged to become participating GLOBE schools.

APPENDIX B

GLOBE Environmental Measurements and Equip'ment

GLOBE environmental measurements will contribute in a significant way to the scientific understanding of the dynamics of the global environment. Every GLOBE school will conduct a core set of GLOBE environmental measurements in the following critical areas: Atmosphere/Climate, Hydrology/Water Chemistry, and Biology/Geology. Where possible, a GLOBE school may coordinate its activities with those of other neighboring GLOBE schools, so that the complete set of GLOBE measurements will be available from a locality. As the GLOBE Program evolves, elective measurements not common to all GLOBE schools may be added in order to address local environmental issues.

Students at all age levels will be active participants in the GLOBE Program. The actual participation will be designed so as to be grade-appropriate for grades K-5, 6-8, and 9-12 (or equivalent). Younger students will make limited measurements which may be qualitative rather than quantitative. Older students will make additional measurements and more sophisticated measurements, as appropriate for their grade level. Measurement equipment will not need to be standardized; rather, performance specifications will be provided.

Following is an example list of core measurements and equipment. The full list will be initially determined and periodically updated as provided in Article 2.A.2, based on experience gained in implementing the GLOBE Program.

MEASUREMENTS

Atmosphere/Climate:

Air Temperature

Precipitation

Cloud Cover/Type

EQUIPMENT NEEDED

Max/Min Thermometer
 Calibration Thermometer
 Instrument Shelter
 Rain Gauge
 Cloud Charts

Hydrology/Water

Water pH
Water Temperature
Soil Moisture

Chemistry:

pH Paper, Pen, or Meter
Alcohol Thermometer
Gypsum Block Sensors
Soil Moisture Meter

Biology/Geology:

Habitat Study

Tree Height
Tree Canopy
Tree Diameter
Species Identification
Phenology

Compass
Meter Measuring Tape
Surveying Markers or Stakes
Clinometer
Densimeter
Diameter Tape
Dichotomous Keys
35mm Camera

APPENDIX C

GLOBE Computer and Communications Systems

In order to derive maximum benefit from the GLOBE Program, all schools will be encouraged to use an international information network, initially using the Internet, along with classroom computers. The World Wide Web multi-media information-access capability has been selected as the basis for IBM-compatible and Apple Macintosh computer systems to support the required GLOBE school activities of data entry, data analysis, and use of GLOBE environmental images. Following is a description of GLOBE computer and communications systems consistent with current GLOBE requirements.

Overall attributes of the *minimum GLOBE school computer configuration* that can execute the necessary software are:

For IBM-compatible systems: a 386 SX or higher level processor; at least 4 megabytes of RAM memory (8 megabytes preferred); a VGA-capable monitor and display driver (Super VGA preferred); a hard disk storage system with as large a capacity as possible (preferably 300 megabytes or larger); and a direct Internet connection or dial-up capability that can use SLIP or PPP protocols with a 14,400 bps modem (preferably supporting V.42bis data compression which can enable 57,600 bps operation). The Windows 3.1 or later operating system is necessary. A printer is desirable.

For Apple Macintosh systems: a 68030 20 Mhz or faster processor; at least 4 megabytes of RAM memory (8 megabytes preferred); a hard disk storage system with as large a capacity as possible (preferably 300 megabytes or larger); and a direct Internet connection or dial-up capability that can use SLIP or PPP protocols with a 14,400 bps modem (preferably supporting V.42bis data compression which can enable 57,600 bps operation). A printer is desirable.

Software for a *higher performance GLOBE school computer system* is being developed that will operate on higher performance, multi-media IBM-compatible systems and on Apple Macintosh systems.

For IBM-compatible systems: a 486/66 or faster processor; 16 megabytes of RAM memory; 500 megabytes of hard disk space; a Super VGA monitor; a double-speed CD-ROM reader; a Soundblaster-

compatible sound card; and an MPEG animation speed-up board will be required. For Apple Macintosh systems: a PowerPC processor; 16 megabytes of RAM memory; 500 megabytes of hard disk space; and a double-speed CD-ROM reader will be required. A communications capability the same as or better than for the minimum configurations above will also be required. A printer will be highly desirable.

It is recognized that there is a broad range of technological capabilities among potential GLOBE schools. The diversity of technology accessible by schools worldwide may require in some cases that environmental measurements be reported in hardcopy and that a variety of media be used to distribute visualization products, including photographs and broadcast television. All schools that want to participate in the program will be accommodated.

Technology associated with the GLOBE Program will continually evolve to higher levels and participants will be encouraged to upgrade over time.